

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION
WASHINGTON 25, D. C.

December 6, 1951

TELEPHONE ENGINEERING MEMORANDUM 531

Subject: Contract to Furnish and Deliver Equipment and Materials,
REA Form DS-T-47

This memorandum is being issued to explain the purpose of the contract entitled "Contract to Furnish and Deliver Equipment and Materials, REA Form DS-T-47," a copy of which is attached.

This form of contract does not include the installation of the equipment and materials being purchased and is to be used in those cases where the installation is to be made by the borrower's own forces or by others under a separate contract.

This form of contract is to be used by borrowers for purchasing central office equipment and materials for new central office installations or for additions to or modification of existing central office equipment as indicated below. The contract form includes a "Notice and Instructions to Bidders" for use in cases where the borrower elects to obtain formal competitive bids for the purchase. This section may be deleted if the contract is to be awarded on the basis of informal quotations.

For completely new central office installations the contract consists of the following:

1. Notice and Instructions to Bidders (include as indicated above).
2. Proposal and Acceptance.
3. Specifications:
 - Part I - General Specifications.
 - Part II - Special Specifications when attached.
 - Part III - Detailed Central Office Equipment Requirements (one required for each central office).

For additions to or modification of existing central office equipment, the contract consists of:

1. Notice and Instructions to Bidders (include as indicated above).
2. Proposal and Acceptance.
3. Detailed Specifications and Requirements (to be prepared by the borrower's engineer).

Additional copies of the contract form may be obtained from REA, upon request.

J. K. O'Shaughnessy
J. K. O'Shaughnessy, Chief
Engineering Division

Attachment: Form DS-T-47

NOTICE AND INSTRUCTION TO BIDDERS

1. Sealed proposals for the furnishing and delivery of central office equipment and materials for the telephone exchange (s) of _____ (hereinafter called the "Owner") which is to be part of the system known as _____ to be financed pursuant to a loan contract between the Owner and the United States of America (hereinafter called the "Government") by the Administrator of the Rural Electrification Administration (hereinafter called the "Administrator") will be received by the Owner on or before _____ o'clock, _____ M., _____, 19____, at _____, at which time and place the proposals will be publicly opened and read.

2. The plans and specifications relating to the above-mentioned equipment and materials, together with all necessary forms and other documents for bidders, may be obtained from the Owner or from the Engineer, _____ at the latter's office at _____.

3. Proposals and all supporting instruments must be submitted on the forms furnished by the Owner and must be delivered in a sealed envelope addressed to the Owner. The name and address of the Bidder and the date and hour of the opening of bids must appear on the envelope in which the Proposal is submitted. Proposals must be filled in in ink or typewriter. No alterations or interlineations will be permitted, unless made before submission and initialed and dated.

4. Prior to the submission of the Proposal, the Bidder shall make and shall be deemed to have made a careful examination of such Plans and Specifications and form of Proposal attached hereto (which are also on file with the Secretary of the Owner and with the Engineer), and all other matters that may affect the cost and the time of delivery of the equipment and materials.

5. In estimating the lowest cost to the Owner as one of the factors in deciding the award of a contract, the Owner will consider, in addition to the price quoted in the Proposals, the following:

6. If requested by the Owner or the Administrator, the Bidder shall furnish evidence, satisfactory to the Owner and the Administrator, that the Bidder has the necessary facilities, ability, and financial resources to perform the obligations specified in the Proposal.

7. The Proposal, when duly accepted, shall be deemed to include the entire contract between the parties thereto, and the Bidder shall not claim any modification thereof resulting from any representation or promise made at any time by any officer, agent, or employee of the Owner or by any other person.

8. The Owner reserves the right to waive minor irregularities or minor errors in any Proposal if it appears to the Owner that such irregularities or errors were made through inadvertence. Any such irregularities or errors so waived must be corrected on the Proposal in which they occur prior to any acceptance thereof.

9. The Owner reserves the right to reject any or all Proposals.

(Owner)

By _____

Date _____

PROPOSAL TO FURNISH AND DELIVER EQUIPMENT AND MATERIALS

To: _____
(Hereinafter called the "Owner")

The undersigned (hereinafter called the "Bidder") hereby proposes to furnish and deliver the equipment and materials (hereinafter called the "Equipment") described in the plans, specifications and drawings (hereinafter called the "Specifications") attached hereto and made a part hereof, financed by a loan to the Owner of the United States of America, acting through the Administrator of the Rural Electrification Administration (hereinafter called the "Administrator"), designated _____.

The Bidder has become informed as to the Specifications and all other matters that may affect the cost and time of delivery of the Equipment.

If, in submitting this Proposal, the Bidder has made any change in the form of Proposal furnished by the Owner, the Bidder understands that the Owner and the Administrator may evaluate the effect of such change as they see fit or they may exclude the Proposal from consideration in determining the award of the contract.

The Bidder agrees that if its Proposal is accepted the following terms and conditions shall govern:

ARTICLE I

Section 1 - Bid Price. The Bidder will furnish and deliver to the delivery points specified below the equipment described in the specifications for the following sums:

Exchange (Name)	Exchange Bid	Delivery Point
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
	\$	
Total Base Bid	\$	
Alternate No. 1 (add) (deduct)	\$	
Alternate No. 2 (add) (deduct)	\$	
Alternate No. 3 (add) (deduct)	\$	
Alternate No. 4 (add) (deduct)	\$	
Alternate No. 5 (add) (deduct)	\$	
Alternate No. 6 (add) (deduct)	\$	
Spare Parts & Maintenance Tools	\$	

Section 2 - Changes in Equipment. The Owner, with the approval of the Administrator, may from time to time during the performance of the contract effected by the acceptance of this proposal, make such changes, additions to or subtractions from the Specifications which are part of the Proposal as conditions may warrant; provided, however, that if substantial change in the Equipment shall require an extension of time, a reasonable extension will be granted if the Bidder shall make a written request therefor to the Owner within ten days after any such change is made, and provided further, that if the cost to the Bidder shall be increased or decreased by any such change or addition, the Owner shall pay the Bidder for the reasonable cost thereof in accordance with a contract amendment signed by the Owner and the Bidder and approved by the Administrator, but no claim for additional compensation for any such change or addition will be considered unless the Bidder shall have made a written request therefor to the Owner prior to the commencement of work in connection with such change or addition.

Section 3 - Taxes. The prices of Equipment set forth herein do not include any sums which are or may be payable by the Bidder on account of taxes imposed by any taxing authority upon the sale, purchase or use of the Equipment. If any such tax is applicable to the sale, purchase or use of the Equipment hereunder, the amount thereof shall be added to the purchase price and paid by the Owner.

ARTICLE II

Section 1 - Delivery. The Bidder will deliver the equipment required hereunder within _____ calendar days after the Administrator shall have approved the contract effected by the acceptance of this Proposal in writing and sent written notice thereof to the Bidder. The time for delivery shall be extended for the period of any reasonable delay due exclusively to causes beyond the control and without the fault of the Bidder, including, but not limited to, acts of God, fires, strikes, floods, and acts or omissions of the Owner with respect to matters for which the Owner is solely responsible; provided, however, that no such delay in the time for delivery of the Equipment shall result in any liability on the part of the Owner, and provided further that any claim for extension of time shall be adjusted at the time any such delay occurs or any such change is made.

Section 2 - Sequence of Delivery. All Equipment as designated in Article 1, Section 1, shall be delivered in the following sequence:

- | | |
|----------|-----------|
| 1. _____ | 7. _____ |
| 2. _____ | 8. _____ |
| 3. _____ | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | 11. _____ |
| 6. _____ | 12. _____ |

If no sequence of delivery is indicated, the Owner shall nevertheless have the right to direct the Bidder to deliver any exchange equipment before any other exchange equipment included herein, and the Bidder agrees to comply with all such reasonable direction.

ARTICLE III

Section 1 - Payments. The Owner shall pay the Bidder the following percentages of the price of the Equipment for each exchange set forth in the Proposal, as and if revised:

(a) 45% when 50% of the equipment for each exchange has been delivered;

90% when all the equipment for each exchange has been delivered.

(b) When the Equipment has been installed, placed in satisfactory operation and tested, the Owner shall certify such fact to the Administrator. Upon the approval of such certification by the Administrator, the Owner shall make final payment therefor to the Bidder; provided, however, such final payment shall be made not later than one hundred twenty (120) days after delivery of the Equipment, unless such approval by the Administrator shall be withheld because of the fault of the Bidder.

ARTICLE IV

Section 1 - Inspection and Tests. All Equipment furnished hereunder shall be subject to the inspection, tests, and approval of the Owner and the Administrator and the Bidder shall furnish all information required concerning the nature or source of any Equipment and provide adequate facilities for testing and inspecting the Equipment at the plant of the Bidder.

Section 2 - Defective Material and Workmanship. The Equipment furnished hereunder shall become the property of the Owner upon delivery; provided, however, that the Owner or the Administrator, within one year after delivery or within the period for which the Equipment is guaranteed, whichever is longer, may reject any Equipment which does not comply with the Specifications or with the guarantees, if any, of the Bidder and the manufacturer, and any defective equipment. Upon any such rejection, the Bidder shall repair or replace such rejected Equipment within a reasonable time after notice in writing from the Owner and in the event of failure by the Bidder so to do, the Owner may make such replacement and the cost and expense thereof shall be paid by and recoverable from the Bidder. All manufacturers guarantees of Equipment, if any, shall be transferred and assigned to the Owner upon delivery of any Equipment and before final payment is made for such Equipment.

ARTICLE V

Miscellaneous

Section 1. The Bidder will hold harmless and indemnify the Owner from any and all claims, suits, and proceedings for the infringement of any patent or patents covering any Equipment purchased hereunder. The Bidder will, at its own cost, (and Owner agrees to permit Bidder to do so) defend any suits which may be instituted by any party against the Owner for alleged infringement of patents relative to the Equipment.

Section 2. The Bidder will furnish only such unmanufactured articles, materials, and supplies as have been mined or produced in the United States, and only such manufactured articles, materials, and supplies as have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced or manufactured, as the case may be, in the United States; provided that foreign articles, materials, or supplies may be used in the event and to the extent that the Administrator shall expressly in writing authorize such use. The Bidder agrees to submit to the Owner such certificates with respect to compliance with the foregoing provision as the Administrator from time to time may require.

Section 3. In the event that any of the provisions contained herein are violated by the Bidder or by any of the Bidder's subcontractors, the Owner may serve a written notice upon the Bidder of intention to terminate the contract resulting from acceptance of this proposal, which notice shall specify the reasons therefor. Unless within ten (10) days after the serving of such notice upon the Bidder such violation shall cease and an arrangement for the correction thereof satisfactory to the Owner be made, such contract shall, upon the expiration of the said ten days, cease and terminate. In the event of any such termination, the Owner may purchase the Equipment necessary for complete performance of such Contract for the account and at the expense of the Bidder, and the Bidder shall be liable to the Owner for any excess cost occasioned thereby. The foregoing shall be in addition to every right or remedy now or hereafter existing at law or in equity or by statute.

Section 4. The Bidder acknowledges that it is familiar with the Rural Electrification Act of 1936, as amended, and Section 35 of the United States Criminal Code, as amended, and the Bidder shall comply with the provisions of said statutes.

Section 5. Each and all of the covenants and agreements contained in the contract resulting from acceptance of this proposal shall extend to and be binding upon the successors and assigns of the parties thereto. However, the Bidder shall not assign such Contract or any part thereof or enter into any contract with any person, firm or corporation for the performance of the Bidder's obligations hereunder, without the approval, in writing, of the Owner and the Administrator.

Section 6. The acceptance of this Proposal by the Owner shall not create a contract unless such acceptance shall be approved in writing by the Administrator within sixty (60) days after the date hereof _____, 19____.

Section 7. This Proposal is made pursuant to the provisions of the Notice and Instructions to Bidders, if any shall be attached hereto, and the Bidder agrees to the terms and conditions thereof.

Section 8. The Bidder warrants that this Proposal is made in good faith and without collusion or connection with any other person or persons bidding for the same work.

ARTICLE VI

Section 1 - Compliance with Regulations. The Bidder will comply with all applicable statutes, ordinances, rules and regulations pertaining to the work, including but not limited to, applicable regulations of the Office of the Defense Mobilization, National Production Authority, Defense Production Administration, Economic Stabilization Agency, Office of Price Stabilization and Wage Stabilization Board.

(Bidder)

By _____

(Title)

(If executed by one other than President, Vice-President, a partner or the individual owner, a power of attorney authorizing execution should accompany this contract.)

ACCEPTANCE

Subject to the approval of the Administrator, the Owner hereby accepts the Proposal of _____ for the Equipment therein described for the Total Base Bid of \$ _____, and

Alternate No. 1 (add) (deduct) \$ _____

Alternate No. 2 (add) (deduct) \$ _____

Alternate No. 3 (add) (deduct) \$ _____

Alternate No. 4 (add) (deduct) \$ _____

Alternate No. 5 (add) (deduct) \$ _____

Alternate No. 6 (add) (deduct) \$ _____

Spare Parts & Maintenance Tools \$ _____

The total contract price is: \$ _____

(Owner)

By _____

President

(Secretary)

Dated _____

SUPPLEMENT

Article I, Section 1, Bid Price, shall be modified as follows:

Notwithstanding the bid prices designated in the Proposal, the Owner agrees to pay the Bidder for materials and equipment furnished hereunder for each exchange the Bidder's price for such materials and equipment in effect at the time of delivery; provided, however, that the price for an exchange shall in no event exceed the Exchange Bid Price designated in the Proposal, by more than ten (10%) percent.

(Bidder)

By _____
(Title)

(Owner)

By _____
President

Date _____

SPECIFICATIONS

Telephone Central Office Dial Equipment 100 to 800 Lines Ultimate Capacity

0. Preface

0.1 These specifications consist of the following parts:

0.11 Part I covers the minimum general requirements and types of service to be provided by dial telephone central office equipment for exchanges from 100 to 800 lines ultimate capacity. Circumstances may require that certain requirements in Part I be amended to meet individual situations. Such deviations will be set forth in Part III and will supersede the requirements of Part I.

0.12 Part II special specification when attached.

0.13 Part III covers the detail central office equipment requirements.

Part I
GENERAL SPECIFICATION

1. DIAL SWITCHING EQUIPMENT

1.01 General. The central office equipment shall provide a means of connecting any dial subset in the exchange with any other dial subset in the exchange or with an available inter-office trunk without the aid of an operator. Each subset shall be connected with the central office by not more than two metallic conductors.

1.02 Subscriber Line Limitations

1.021 The central office equipment shall operate satisfactorily at the manufacturer's minimum battery voltage with subscriber lines which meet the following conditions:

1.0211 Loop resistance - 0-1100 ohms maximum including the telephone instrument.

1.0212 Line Leakage - 15,000 ohms minimum between conductors or from either or both (conductors in parallel) conductors to ground over the range of loop resistance specified in 1.0211.

1.0213 Line capacitance 6 mfd. maximum bridged across the far end of a line which has a loop resistance of 500 ohms and leakage not exceeding the minimum specified in 1.0212.

1.022 Suitable long line adapters shall be provided for lines which do not meet the above requirements.

1.023 The central office equipment shall operate satisfactorily when used with dials whose speed of operation is between 8 - 12 impulses per second and whose break period is 62.5 percent, plus or minus 4%, of the total impulse period.

1.03 Class of Service

1.031 When frequency ringing is utilized the general objective is full selective ringing on all lines. Within a particular exchange area, however, there may be some lines on which full selective ringing is impractical due to inductive interference. In such instances Part III of these specifications will specify divided ringing, it being required, however, that all connectors designed to provide for dividing ringing shall be capable of ringing more than five parties on a bridged basis without requiring changes

in the central office equipment or wiring. Interrupters providing a two ring code shall be furnished in all offices using full selective divided ringing.

- 1.032 The equipment shall be arranged so that the following classes of service may be offered to subscribers in the exchange area:
- 1.0321 Flat rate individual line-bridged ringing.
 - 1.0322 Flat rate two party - full selective ringing.
 - 1.0323 Flat rate four or five party - full selective ringing.
 - 1.0324 Flat rate eight or ten party - ringing as specified in Part III.
 - 1.0325 Flat rate PBX or trunk hunting consecutively numbered lines - bridged ringing.
 - 1.0326 Post pay pay station - same as individual line except with tone equipment.
- 1.033 In general unless otherwise specified in Part III of these specifications, each exchange shall be equipped to provide a minimum of two trunk hunting groups of not less than three lines each for consecutively numbered line or PBX service. Where an exchange does not have an immediate requirement for any or all trunk hunting groups it shall be possible to utilize the connector terminals for individual or party line service. An exception to the above general requirement is made for exchanges initially equipped for 100 lines or less which require three or more inter-office trunk groups. In those instances one trunk hunting group for consecutively numbered line of PBX service will be considered as adequate unless otherwise specified in Part III.
- 1.034 A call to an operator from a pay station shall cause a spurt of tone of from 0.5 to 1.0 second duration to be heard by the operator when she plugs into the answering jack. It shall be possible to repeat the tone signal by removing and reinserting the plug in the jack. Pay station numbers shall be arranged so that the fourth digit from the last is "9" in systems using more than three digit directory numbers.
- 1.035 Ringing shall be completely automatic and intermittent and shall be cut off from the called line immediately upon removal of the receiver or handset at the called station.

1.04 Ringling Digit Significance

Ringling digits shall have a standardized significance as indicated below:

10-Party Frequency Ringling

Ringling digit	Side of Line	Ringling Code	Frequency of ringling voltage (CPS)					
			33-1/3	50	66/2/3	16-2/3	25	
			30	42	54	66	20	
			30	40	50	60	20	
1	Neg.	1 long	x					Harmonic
2	Neg.	1 long		x				Synchromonic
3	Neg.	1 long			x			Decimonic
4	Neg.	1 long				x		
5	Neg.	1 long					x	
6	Pos.	2 shorts	x					
7	Pos.	2 shorts		x				
8	Pos.	2 shorts			x			
9	Pos.	2 shorts				x		
0	Pos.	2 shorts					x	

8-Party Superimposed

<u>Ringling Digit</u>	<u>Side of Line</u>	<u>Ringling Code</u>	<u>Ring Polarity</u>
1	Neg.	1 long	-
2	Pos.	1 long	-
3	Neg.	1 long	-
4	Pos.	1 long	/
5	Neg.	2 shorts	-
6	Pos.	2 shorts	-
7	Neg.	2 shorts	/
8	Pos.	2 shorts	/

10-Party Divided Code

<u>Ringling Digit</u>	<u>Side of Line</u>	<u>Code*</u>		
1	Neg.	1		
2	Pos.	1		
3	Neg.	2		
4	Pos.	2		
5	Neg.	3		
6	Pos.	3		
7	Neg.	4		
8	Pos.	4		
9	Neg.	5		
0	Pos.	5		
			<u>*Code Ringling</u>	
			Code 1	1 long
			Code 2	2 long
			Code 3	1 long-1 short
			Code 4	1 long-2 shorts
			Code 5	3 shorts

1.05 Wire and Cable

- 1.051 Switchboard cable and cable forms shall be made with soft annealed tinned copper wire of suitable cross section to provide ample and safe current carrying capacity and mechanical strength. Wire insulation shall be such as to insure that the insulation resistance and dielectric strength requirements as outlined in these specifications are met under the conditions of temperature and humidity specified herein.
- 1.052 Adequate measures shall be taken in the design and installation of the equipment and cabling to limit the cross-talk level of the switchboard. Conductors carrying ringing current shall be cabled so as to insure against induction in talking circuits.
- 1.053 The switchboard and individual relay racks shall be furnished with suitable terminal blocks for connection to all external circuits and all necessary wiring shall be brought out and terminated on these terminal blocks.

1.06 Alarms

- 1.061 If the office is of the unattended type means shall be provided for transmitting an alarm indication to an attended location as well as indicating the alarm condition locally by means of lamps. By dialing a code set aside for that purpose it shall be possible at any time to determine whether the nonstandard condition is of a major or minor nature. The initial alarm indication at the attended location shall continue until the alarm has been acknowledged.
- 1.062 Visual and transmitted alarms shall be provided as follows:

<u>Cause</u>	<u>Time Delay</u>	<u>Alarm Sender Signal</u>
<u>Major</u>		
Common Equipment Fuse	0	No tone
Low voltage	0	No tone
Linefinder control blocked	2-4 minutes	No tone
Ringing machine transfer		
2nd set faulty	0	No tone
Interrupter transfer 2nd		
set faulty	0	No tone
Rectifier failure*	30 minutes	No tone

*See paragraph 4.64

<u>Cause</u>	<u>Time Delay</u>	<u>Alarm Sender Signal</u>
<u>Minor</u>		
Individual circuit fuse	0	Busy tone
Switch failure to release	2-4 minutes	Busy tone
Ringling machine transfer 2nd set operating satisfactorily	0	Busy tone
Interrupter transfer 2nd set operating satisfactorily	0	Busy tone
Permanent condition	20-30 minutes	1 ring code
No trouble		2 ring code

1.07 Intra-Office Trunking

- 1.071 The number of intra-office trunks shall be calculated from the traffic information furnished in Part III of these specifications on the basis of one last call in one hundred per switching stage using Molina Traffic Tables. The equipment shall be designed for ready expansion, without rewiring (except insofar as regrading is necessary), to handle the anticipated future calling rate per line indicated in Part III.
- 1.072 The equipment shall be arranged that during periods of light traffic successive calls from the same line will take different paths thru the switching equipment. This action shall in no way be impaired by the failure, removal or cutting out of any switches, relay groups or links.
- 1.073 Means shall be provided in the switchboard to ensure approximately equal duty for each switch or relay group seized in initiating a call.
- 1.074 Switchboards of 100 lines ultimate capacity shall be designed so that any calling line in the switchboard shall have direct access to the total number of linefinders provided in that switchboard. Switchboards utilizing linefinder groups in excess of 100 lines shall be designed so that any calling line in a linefinder group shall have access to all linefinders in that group.
- 1.075 The equipment shall be so designed that when completing a call, switch thru to the called line shall be accomplished on local calls only after the ringing digit has been dialed.
- 1.076 The release of the switch train after the completion of a local call shall be under the control of the calling party.

1.08 Inter-Office Trunking

- 1.081 Unless otherwise specified in Part III of this specification all incoming inter-office trunk circuits shall terminate on incoming selectors or connectors.
- 1.082 In the case of free service trunks to another office a busy condition shall cause busy tone to be received by the calling party. If trunks carry toll traffic a busy line condition shall be indicated to the toll operator by a flashing signal (60 IPM) on her supervisory lamp in addition to the normal busy tone. An all trunks busy condition from selector levels or any inter-office trunk hunting levels shall be indicated to the toll operator by a 120 IPM flash with tone.
- 1.083 Part III will specify the method of operation when verification facilities are required. In any case, an operator and only an operator shall be able to override a line busy condition.

1.09 Tone Indications. Tones shall be provided to indicate the progress of a call through the exchange; dial tone - to indicate that the switching equipment is ready to receive dial impulses; busy tone - to indicate that a busy line has been encountered; ring back tone - to indicate to the calling subscriber that the line called is being rung; all trunks busy tone from selector levels or inter-office trunk hunting levels (when applicable) - to indicate that the calling subscriber should try to make his call at some later time.

1.10 Traffic Meters

- 1.101 A linefinder peg count meter shall be provided for each linefinder group.
- 1.102 A linefinder "All links busy" or overflow meter shall be provided for each linefinder group.
- 1.103 An overflow or "All trunks busy" meter shall be provided for each nongraded group of two way or one way outgoing inter-office trunks.
- 1.104 A "last trunk busy" meter shall be provided for each graded group of two way or one way outgoing inter-office trunks.
- 1.105 A connector peg count meter shall be provided for each connector group when the number of connector groups initially equipped exceeds one.

1.11 Timed Disconnect. The central office equipment shall be designed to automatically disconnect any line after a predetermined interval should a "permanent" condition occur prior to the transmission of dial impulses. When the "permanent" is cleared the line shall automatically be reconnected to the central office equipment in a normal manner.

1.12 Reverting Call

1.121 It shall be possible for subscribers on the same party line to call each other.

1.122 Reverting calls, when 100% lockout is specified in Part III, shall release the local link, and talking battery shall be supplied from the line circuit.

1.123 A "no answer" disconnect feature shall be provided which shall operate after a period not exceeding six minutes should the called party not answer a reverting call.

1.124 When directory number type of revertive call is furnished, the equipment shall be designed to provide a distinctive tone to the called subscriber when he answers as an indication that a revertive call is being made.

1.13 Fusing and Protection

1.131 The equipment shall be completely wired and equipped with trouble signals, fuses, and all associated equipment for the wired capacity of the frames or cabinets provided. Fuses shall be of the alarm and indicator type.

1.132 In linefinder-connector systems each link shall be individually fused and in selector type systems each switch or relay group shall be individually fused except that linefinders and selectors tied back to back may have a common fuse.

1.133 All relay and motor coils shall preferably be of the self-protecting type, capable of being continuously energized at rated voltage without injurious results. A permissible exception to this requirements is in the case of supervisory relays on switch type equipment. In any case, however, it is required that nonselfprotecting coils shall not at any time cause damage to other equipment components.

1.14 Relay Impedance Balance Requirements. Relays supplying talking battery to subscriber lines shall be adequately balanced as to impedance to ground to prevent troublesome talking circuit noise on certain lines resulting from induced noise voltages from nearby power lines acting on unbalanced relay impedances to ground.

1.15 Test Access Facilities

- 1.151 Equipment units shall be suitably designated and numbered.
- 1.152 Each switch or relay group shall be provided with test access facilities for testing the equipment.
- 1.16 Radio and Television Interference. Adequate precautionary measures shall be employed by the supplier to limit the radiation of radio frequency noise voltages generated by the central office equipment.
- 1.17 Heat and Humidity Requirements. It shall be possible for all components of equipment to meet the requirements of this specification at any ambient temperature within the range of 20°F. (-7°C.) to 120°F. (49°C.) and at a humidity of 90-95% except as otherwise noted.
- 1.18 Protection Against Corrosion. In order to prevent corrosion all metal parts shall be constructed of suitable corrosion resisting materials treated and/or painted to render them adequately resistant to corrosion under the climatic and atmospheric conditions existing in the area in which the equipment is to be installed.
- 1.19 Screws and Screw Threads

- 1.191 Except as permitted in paragraph 1.19⁴, screw threads for all threaded securing devices shall be of American National form in accordance with the National Bureau of Standards Handbook H-28. All bolts, nuts, screws and washers shall be of nickel-copper alloy, steel, brass or bronze.
- 1.192 All bolts used shall be sufficiently long to ensure that, when nuts are screwed home, the first two threads of the bolt shall not be used. The length of the threaded portion on all bolts and nut ends of studs shall be not less than $1\frac{1}{2}$ times the bolt diameter. Unless otherwise specified, studs shall engage the part into which they are set for a length equal to at least one diameter.
- 1.193 Self-tapping screws shall not be used to mount or assemble any phonolic or plastic part which may require removal or disassembly for maintenance.

- 1.194 When screws with threads not in compliance with paragraph 1.191 are used they shall be readily identifiable as being nonstandard. In addition a quantity of screws representing ten percent but in no case more than 50 screws of each type of the amount used in the equipment shall be provided as spares with screws of each type separately packaged.

1.20 Miscellaneous

- 1.201 The Bidder shall furnish a tentative floor plan layout drawing indicating the arrangement of the equipment and giving dimensions for major units of equipment. The drawing shall show provision for the ultimate capacity as indicated in Part III of these specifications as well as minimum ceiling height required for installation, maintenance and ventilation of the equipment.
- 1.202 Within 30 calendar days after the date of final approval of the contract the Owner will furnish the necessary data concerning the building in which the equipment is to be installed to enable the Bidder to plan the manner in which the installation shall take place.
- 1.203 Within 30 calendar days after receiving the necessary building data the Bidder shall supply for approval by the Owner, floor plan drawings showing exact location of all equipment both initial and ultimate, including conduit runs, power distribution boxes, piers, openings and sleeves. In addition, conductor sizes shall be shown on the drawings for all A.C. power leads which must be extended from the power distribution box by the Owner. Within 30 calendar days after receiving the floor plan drawings from the Bidder the Owner shall either approve the drawings or take the necessary steps to have the drawings changed to meet his approval.
- 1.204 A switching diagram drawing shall be included indicating switch arrangement, switch quantities and traffic distribution.
- 1.205 The Bidder shall make recommendations concerning measures to be taken to insure adequate ventilation and heating of the central office building.
- 1.206 Three complete sets of equipment, circuit, circuit description, wiring list, circuit adjustment sheets and job drawings shall be furnished the Owner at the time of delivery of the equipment.

- 1.207 Separately priced and itemized lists of spare parts and maintenance tools as recommended by the Bidder shall be provided with the bid for the Owner's consideration.

2. MAIN DISTRIBUTING FRAME

- 2.1 Part III of these specifications specifies the type of main distributing frame required. When an "A" type is specified a quantity of protectors equal to the wired line and trunk capacity of the switching equipment shall be provided. When "B" type is specified protectors shall be furnished for all outside cable pairs.
- 2.2 Central office protectors shall be comprised of carbon blocks and relatching type heat coils.
- 2.3 It shall be possible to test all lines and trunks from the main distributing frame.

3. TEST EQUIPMENT

- 3.1 One hand test telephone shall be provided.
- 3.2 A wire chief's test set shall be provided and shall include a high resistance two scale meter (volts and ohms); an operators telephone circuit, dial circuit, outgoing trunk to dial equipment and the necessary test keys. The following test features shall be provided for:

Test for bridged foreign E. M. F.
Test of exchange battery
Test for short circuits
Test for open circuits
Test for grounds
Test for tip negative potential
Test for ring negative potential
Test condenser in subscribers set
Supply talking battery to the line
Ring subscriber
Test in and out of exchange
Test heat coils

4. POWER EQUIPMENT

- 4.1 Operating Voltage. The nominal switchboard voltage shall be 48 volts d.c.
- 4.2 Counter EMF Cells. Counter emf cells shall be used only for the purpose of reducing the voltage applied to the switching equipment during the time the battery is being given an equalizing charge and shall not be used during normal operation of the equipment with fully charged battery cells.

4.3 Power boards, cabinets or shelves shall be designed initially to handle the exchange when it reaches the ultimate capacity as indicated in Part III of the specifications.

4.4 Ringin9 and Interrupter Equipment

4.41 The principal ringin9 current source may be operated from the commercial a.c. voltage. However, adequate standby equipment shall be provided to operate from the central office battery.

4.42 Interrupter units shall be provided in duplicate with at least one unit operable directly from 48 volts d.c.

4.43 Provision shall be made for automatic transfer from regular to standby ringin9 and interrupter equipment in case of failure of the commercial a.c. supply or in case the regular equipment becomes faulty.

4.44 When static tone generators operating from commercial a.c. voltage are used as the primary source of tones provision shall be made for continuity of operation during a power failure. When other types of tone generators are employed adequate standby tone equipment shall be provided which may be placed in operation upon failure of the regular equipment or during a power failure. Transfer may be accomplished automatically or by dialin9 a special number set aside for the purpose.

4.5 Power Control Equipment. Battery and charger control switches, d.c. voltmeter, d.c. ammeter, fuses or circuit breakers, supervisory and timer circuits shall be provided. When vibrator type frequency ringin9 converters are provided, a portable or panel mounted frequency meters and an a.c. voltmeter shall be provided as required in Part III of these specifications.

4.6 Chargin9 Equipment

4.61 Chargin9 shall operate on a full float basis and shall be capable of being manually turned on and off and shall be of the full wave, self-regulating, constant voltage, dry disc or equivalent type.

4.62 When chargin9 lead-acid batteries the rectifier output voltage shall be adjustable to 2.15 volts per battery cell being charged and shall not vary more than plus or minus .02 volts/cell between 10% load and 100% load. Between 3% and 10% load the output voltage shall not vary more than plus or minus .04 volt/cell. Beyond full load current the output voltage shall drop sharply. The above output voltage limitations shall be maintained with line voltage variations of

plus or minus 10%. Provision shall be made to manually change the output voltage of the rectifier to 2.33 volts per cell to provide an equalization charge on the battery.

- 4.63 The maximum r.m.s. value of the alternating component (ripple) of the rectifier shall be as low as practicable and shall in no case exceed .10 volts from 0 -120 cycles or .05 volts above 120 cycles at the output terminals of the rectifier filter with the battery connected.
- 4.64 The charging equipment shall be equipped with means for indicating a failure of charging current whether it is due to A. C. power failure, an internal failure in the charger, a blown fuse in either the A.C. or D.C. connections to the charger, or due to any other circumstances which might cause the output voltage of the charger to drop below the battery voltage.

Part III

SPECIFICATIONS

DETAIL CENTRAL OFFICE EQUIPMENT REQUIREMENTS

Telephone Company _____ Location _____

Office: _____ Location _____ Date _____

1.0 General. The Bidder shall furnish his equipment schedule for the purpose of information only, listing in detail, the equipment and materials to be furnished under the proposal. Notwithstanding such equipment schedule, the equipment and materials furnished by the Bidder must meet the requirements of Part I and Part III of these specifications.

2.0 Local Service Lines

		Number of Lines		
		Initially Equipped	Anticipated	
			5-yrs.	10-yrs.
2.1	Individual Lines (excluding PBX).....			
2.2	Two Party.....			
2.3	Four Party.....			
2.4	Eight Party.....			
2.5	Paystations.....			
2.6	Consecutively numbered lines or PBX Groups:...			
	No. of Groups No. of Lines in Group			

	(1)			
	(2)			
	(3)			
	(4)			
	(5)			
2.7	Total local service lines			

2.8 Switchboard wired capacity: Subscriber Lines _____

2.9 Anticipated ultimate capacity
(25 years): Subscriber Lines & Trunks _____

3.0 Long Line Equipment Data

3.1 Number of lines having a loop resistance, including the
telephone set, greater than 1100 ohms: 1100-1200 ohms _____

1200-1500 ohms _____

1500-2000 ohms _____

4.0 Type of Operation (Check one)

4.1 Terminal per line _____

4.2 Terminal per station _____

4.21 Number of connector terminals _____

5.0 Permanent Timing

5.1 Percentage of line circuits equipped for lockout _____

6.0 Conversation Timing

6.1 On all nontoll calls _____

6.2 On extended scope trunk calls _____

6.3 On other trunk calls _____

6.31 Explain: _____

7.0 Busy Verification

7.1 By prefix digit (Indicate number dialed) _____

7.2 By suffix digit (Indicate number dialed) _____

8.0 Ringing Equipment

8.1 Primary Ringing current generator (check one)

8.11 Rotary machine _____

8.12 Static type _____

8.13 Vibrator _____

8.14 Other (specify) _____

8.2 Standby Ringing current generator (check one)

8.21 Rotary Machine _____

8.22 Vibrator _____

8.23 When A.C. power is off, primary ringing
current generator operates from central
office batteries by means of dynamotor _____

8.24 Other (specify) _____

8.3 Type (check one)

8.31 Harmonic (16 2/3, 25, 33 1/3, 50, 66 2/3) _____

8.32 Decimonic (20,30,40,50,60) _____

8.33 Synchromonic (20,30,42,54,66) _____

8.34 Superimposed (20) _____

8.35 Other (explain) _____

8.4 Frequency and volt meters for ringing measurements
(check one)

8.41 Panel mounted _____

8.42 Portable _____

8.43 Not required _____

9.0 If restricted service facilities are required, check
appropriate blank:

9.1 On a per line basis _____

9.2 On a per group basis _____

Restricted Level

Trunks To

No. of Lines by
Class of Service

9.3 Describe any restricted services facilities required on
incoming extended scope trunk calls _____

10.0 Paystation Operation (check one)

10.1 Postpay _____

10.2 Prepay _____

11.0 Revertive Call (check one)

11.1 Revertive call switch _____

11.2 Directory number _____

11.3 Either 11.1 or 11.2 _____

12.0 Type of Connectors (check one)

12.1 All connectors multi-party type _____

12.2 Type of connectors differ in various groups _____

When item 12.2 is checked explain fully: _____

13.0 Traffic data

13.1 When all connectors are of the multi-party type or when the central office is to operate on a terminal per station basis, the following statement shall be completed:

The central office equipment shall be engineered to handle an average originating busy hour calling rate of _____ unit calls per line. It is anticipated that during the next ten-year period the average calling rate will increase to _____ calls per line.

- 13.2 When all connector groups are not of the multi-party type and the central office equipment operates on a combination terminal per line and terminal per station basis or on a terminal per line basis the following information shall be given:

Class of Service	Total Average Originating UC/L	Average Nontoll Terminating UC/L	Average Toll Terminating UC/L
Individual Lines			
Two Party			
Four Party			
Eight Party			
Paystations			
Consecutively Numbered Lines			
PBX Lines			

14.0 Test Train

14.1 Test Connectors (check one)

14.11 Required

14.12 Not Required

14.2 Number of test distributors required

15.0 Intercept Facilities

15.1 Required

15.2 Not Required

15.3 Vacant Selector Levels (check one)

15.31 By Tone

15.32 By Operator

15.4 Changed or nonexistent subscriber numbers

15.41 By Tone

15.42 By Operator

15.5 Number of party lines on intercept simultaneously

- 15.6 Number of individual lines on intercept simultaneously _____
- 15.7 Number of intercept trunk circuits _____
- 15.8 Method of reaching operator: (check one)
- 15.81 Separate trunk group _____
- 15.82 Regular inter-office trunks _____
- 15.821 Idle trunk selecting equipment required _____
- 15.822 Intercept trunks connected to last choice trunks in inter-office trunk group _____

16.0 Numbering Scheme

- 16.1 Local directory numbers shall be _____ digits (indicate number of digits)
- 16.2 On local calls (calls from one subscriber to another served by the same central office) the _____ dial pull (s) shall be absorbed.
- 16.3 On extended scope calls to _____ the _____ dial pull (s) shall be absorbed.
- 16.4 On extended scope calls to _____ the _____ dial pull (s) shall be absorbed.
- 16.5 Local first selector (or equivalent) level assignment:

"0" _____

"9" _____

"8" _____

"7" _____

"6" _____

"5" _____

"4" _____

"3" _____

"2" _____

"1" _____

17.0 Special Service calls are answered: (check appropriate items)

17.1 At the operator office in _____

17.11 By means of the regular inter-office toll
trunks _____

17.12 By means of the regular inter-office
extended scope trunks _____

17.13 By means of a separate special
service trunk group _____

17.2 Locally

17.21 Explain: _____

17.3 The special service operator (s) is reached by dialing:
(Check appropriate items)

17.31 "0" for all special services _____

17.32 _____ for all special services _____

17.33 Special service codes as follows:

<u>Function</u>	<u>Number Dialed</u>	<u>Number of Circuits</u>
Wire Chief	_____	_____
Information	_____	_____
Repair	_____	_____
Business Office	_____	_____
Revertive Calls	_____	_____
_____	_____	_____
_____	_____	_____

17.34 Other method (Explain)

18.0 Main Distributing Frame

18.1 Type (check one)

18.11 "A" _____

18.12 "B" _____

18.2 Type of mounting

18.21 Wall Type _____

18.22 Floor Type _____

18.3 Total number of outside cable pairs to be terminated _____

18.4 Full L.I.D.F. cross connection facilities (check one)

18.41 Required _____

18.42 Not Required _____

18.5 State if additional protectors are required beyond minimum required in Part I:

19.0 Central Office Battery

19.1 A battery reserve of _____ busy hours shall be provided for this office when it reaches _____ lines at the anticipated traffic rate specified in item 13.0.

19.2 Type of battery rack required (check one)

19.21 Single tier _____

19.22 Two tier _____

19.23 Two step _____

19.24 Three step _____

19.25 Other _____

Explain: _____

19.3 Type of battery (check one)

19.31 Lead Antimony _____

19.32 Lead Calcium _____

20.0 Charging Equipment

20.1 Charging equipment shall be provided capable of charging the office battery on a full float basis when the office reaches _____ lines at the anticipated traffic rate specified in item 13.0.

20.2 Indicate any special requirements concerning the charging equipment

20.3 Primary power supply data:

20.31 Voltage _____

20.32 Phase _____

20.33 Frequency _____

20.4 Special power equipment requirements: _____

21.0 Test Equipment (check desired items)

One hand test telephone X

Wire Chief's test cabinet X

Routine test set _____

Current flow test set _____

Howler circuit _____

Dial speed test circuit _____

22.0 Alarm Signals (check one)

22.1 Transmitted to operator office for handling _____

22.2 Handled locally _____

22.21 Explain in detail _____

23.0 Floor plan information (check appropriate item)

23.1 A new building is contemplated, therefore a suggested floor plan is requested from the Bidder. _____

23.2 Attached is a drawing of the room in which equipment is to be installed. _____

24.0 Trunking Requirements:

24.1 Attached is a table of trunking requirements. In addition a description shall be given, in detail, of any special requirements such as universal numbering with other exchanges, tandeming arrangements, dial back trunks, etc. A sketch showing relative location of exchanges and a number of circuits shall be included when there are trunk groups to more than one office.

25.0 Explanatory Notes:

TRUNKING REQUIREMENTS

OFFICE

LOCATION

NAME OF DISTANT OFFICE →						
DIGIT(S) DIALED TO REACH DISTANT OFFICE →						
NUMBER AND TYPE OF OPERATION OF INTEROFFICE TRUNKS	LOOP	2-WAY				
		1-WAY INC.				
		1-WAY OUT.				
	SIMPLEX	2-WAY				
		1-WAY INC.				
		1-WAY OUT.				
	PHANTOM COMPOSITE	2-WAY				
		1-WAY INC.				
		1-WAY OUT.				
	CARRIER	2-WAY				
		1-WAY INC.				
		1-WAY OUT.				
USAGE	TOLL					
	EXTENDED SCOPE					
	SPECIAL AND OTHER					
TYPE OF SWITCHBOARD AT DISTANT END	MAGNETO					
	C.B. MANUAL					
	DIAL					
	TOLL					
TRUNK TERMINATION (LOCAL END)	INCOM. SELECT OR CONNECTOR					
	LINE CIRCUIT					
NO. OF TRUNK TERMINATING CIRCUITS	LOCAL END					
	DISTANT END**					
NO. OF PHANTOM GROUP COMPOSITE SETS*	LOCAL END					
	DISTANT END					
TRUNK PHYSICAL CHARACTERISTICS	APPROX. LOOP RESISTANCE					
	GAUGE					
	LOADING					
	LENGTH					

*COMPOSITE SETS TO INCLUDE SIGNAL CIRCUITS

**WHEN DISTANT END TRUNK TERMINATING CIRCUITS ARE REQUIRED AT A MANUAL OFFICE THE CORD CIRCUIT DRAWING NUMBER AND MANUFACTURER SHOULD BE INDICATED.

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